REMARKS

AMENDMENTS

The objection to claims 26 and 27 is traversed. A period has been added to the end of each of claims 26 and 27. A separate paper showing a "marked up" version and a "clean" version of each of claims 26 and 27 is attached.

Claim 31 has been canceled without prejudice. New claims 34 and 35 have been added. Claim 31 was dependent upon claim 29 which was withdrawn by the Examiner. New claims 34 and 35 are drawn to the same subject matter as old claim 31, but depend from claims 20 and 21, respectively, which have not been withdrawn.

THE INVENTION

The article of manufacture of this invention is comprised of a hollow capsule which employs a urethane/vinyl hybrid polymer as the primary encapsulating material. A solid, water-soluble chemical composition is enclosed within the hollow interior of the capsule. The urethane/vinyl hybrid polymer is permeable to water and aqueous solutions, but not soluble in aqueous solutions. Improved results are obtained when the urethane/vinyl hybrid polymer is employed to enclose various chemical compositions, including caustic materials.

In another aspect, the urethane/vinyl hybrid polymer, the first material, is a supporting matrix for a second material fixed in the supporting matrix.

As mentioned, the first material, the primary encapsulating material of this invention, is comprised of a urethane/vinyl hybrid polymer. The hybrid polymer can be crosslinked with polyaziridine, carbodiimides, epoxies and metal ion crosslinkers.

In the operation of the invention, an aqueous liquid in contact with the exterior of the capsule of this invention gradually passes, by diffusion, through the first material, i.e., the enclosing membrane wall, to the interior of the capsule and therein contacts and dissolves the encapsulated chemical composition, i.e., the first chemical composition, to form a solution of the chemical composition in water. The solution then gradually passes, by diffusion, from the interior of the capsule through the membrane to the exterior of the capsule to contact the fluid to be treated. The diffusion process, which consists of diffusion of the aqueous liquid into the capsule and diffusion of the solution out of the capsule, requires an extended period of time to be completed to thereby avoid release of all of the chemical agent over a very short span of time.

It is believed that the diffusion process is driven by very small pressure differences between the interior and exterior of the capsule. Thus, when the pressure in the interior of the capsule is less than the pressure on the exterior of the capsule, the aqueous liquid passes through the membrane wall to the interior of the capsule to contact and dissolve the agent. Upon dissolution, pressure within the interior of the capsule increases to a value greater than the pressure on the exterior of the capsule. Accordingly, upon this pressure increase, the solution passes through the membrane to the exterior of the capsule. In some instances, depending upon the nature of the aqueous liquid and/or the nature of the agent, a gas may be produced within the interior of the capsule. In spite of the described pressure actuated

mechanism, it is believed that the pressure stresses do not cause the capsule to rupture, break, dissolve or disintegrate. The capsule remains intact during the entire diffusion process.

The particle size of the second material fixed in the supporting matrix plays an important role in the diffusion process. In this regard, it is believed that capsules which contain particles having a size of less than about 1 micron, i.e., submicron particles, do not operate to dissipate internal pressure, generated as described above, at a rate sufficient to prevent rupture of the particle. Capsules which contain particles having a size in the range of from about 1 to about 15 microns fixed in the matrix, do operate to dissipate internal pressure at a rate sufficient to prevent rupture of the capsule.

None of the references cited disclose or suggest urethane, a crosslinked urethane, a urethane/vinyl hybrid polymer or a crosslinked urethane/vinyl hybrid polymer as an encapsulating material for a capsule enclosing a chemical composition. There is no cited reference which discloses or suggests that an aqueous material can diffuse through the primary encapsulating material of this invention.

ART REJECTIONS

The rejection of claims 16, 18, 20, 21 and 23-28 under 35 USC 103(a) as being obvious over Walles et al (US 4756844) in view of Vijayendran et al is traversed for the following reasons.

Walles et al disclose capsules containing chemical agents and methods of using the capsules to treat a fluid in contact with the exterior of the capsules. In this regard Walles et al disclose an encapsulated bleach as a laundry detergent additive.

Walles et al disclose capsules containing simple salts, such as calcium chloride and potassium bisulfate (Col. 3, lines 23-24), enclosed in a membrane of styrene-butadiene rubber (Col. 5, line 12).

Walles et al contain a group of claims (1-20) specifically drawn to a composition comprised of an agent and a membrane which surrounds the agent. The membrane is further comprised of "submicron particles." The agent is "suitable for use in a selected environment." The chemical identity of the agent is generally defined in claims 9, 10, 11 and specifically defined in claim 12. Ammonium persulfate is specifically claimed in Walles et al and, because it is a bleach and an oxidizing agent, it is also named in claims 10 and 11.

Walles et al contain a group of claims (21-24) specifically drawn to a composition comprised of a fabric laundering formulation in combination with a composition comprising an oxidizing agent and a membrane which surrounds the agent. The membrane is further comprised of "submicron particles." The oxidizing agent is suitable to react with an aqueous environment to liberate a gas.

Walles et al contain a claim (29) specifically drawn to a composition comprised of an agent and a membrane which surrounds the agent. The agent is "suitable for use in a selected environment." The claim is drawn to an improvement comprising the membrane further comprising "submicron particles" which are substantially inert to the membrane and the agent.

It is clear that the essential novelty of Walles et al resides in the presence in the membrane of "submicron particles that are substantially inert to the membrane and the agent." The following passages taken from the disclosure of Walles et al are cited to place the issue of the submicron particles in the context of the invention.

The "BACKGROUND" portion of the disclosure of Walles et al specifically cites prior U.S. Patent 3,952,741 which, according to Walles et al, "illustrates a controlled release system based on osmotic bursting of a water permeable wall." (Col. 1, lines 63-65) It is plain, then, that Walles et al is basically an improvement on the prior art and it remains, therefor, to determine the scope and content of the novelty. Walles et al state that the invention is a composition and method for increasing the uniformity of release time for a given quantity of agent into a selected environment. (Col. 2, lines 26-28) The problem solved was to avoid "essentially sequential releases" to prevent "undesirable local high concentrations" of agent. (Col. 2, lines 18-20)

The Walles et al invention is an encapsulated composition that allows controlled release of an agent at a "narrowly predetermined time." (Col. 2, lines 58 & 59) According to the invention, the release of the agent as desired is effected by diffusion of the surrounding environment through the membrane encapsulating the agent until the membrane **ruptures** and releases the agent. (Col. 2, lines 62-67)

With respect to the "submicron particles," Walles et al disclose at Col. 2, line 67 to Col. 3, line 4, "This membrane has a quantity of inert compound incorporated into it. The inert compound, called an anti-coalescent, operates to improve the uniformity of application of the membrane, which in turn improves the uniformity and predictability of the release times of a given sampling of agent."

Walles et al state at Col. 3, lines 12-23, "In one preferred embodiment the release mechanism is that of simple osmotic diffusion, in which the increased volume within the membrane due to the presence of a quantity of the environment material causes **rupture** of the membrane and concurrent release of the agent to the environment at large. The diffusion of the environment through the permeable membrane, resulting from the osmotic attraction and/or hygroscopicity of the agent, increases the volume enclosed, resulting in distension of the membrane and, eventually, its **rupture** and resultant release of the agent to the environment."

In another aspect, by appropriate selection of agent and environment to promote a reaction which releases a gas, the distension of the membrane is hastened and therefor hastens the **rupture** thereof. (Col. 3, lines 26-32) Walles et al refers to this "novel mechanism" as "an environment-actuated, gas-assisted **rupture** mechanism." Col. 4, Lines 35-36

Walles et al then closes this explanation of reaction mechanism by stating at Col. 3, lines 32-37, "The presence within the membrane material of a quantity of an inert anti-coalescent compound alters the timing and reliability of **burst-type** release, as compared with membranes of similar composition without an anti-coalescent, as will be described below."

Walles et al discloses at Col. 5, Lines 44-51, "An important aspect of the present invention is that there is incorporated into the membrane material an amount of at least one compound that is inert to both the agent and membrane matrix material, and which comprises particles having submicron diameters. Thus, the inert compound, which serves as an anti-

coalescent as will be described below, should be essentially a finely comminuted powder of colloidal-size particles."

Walles et al, at Col. 6, Line 55 to Col. 7, Line 4, lists four main advantages to the addition of the anti-coalescent to the membrane. One of the advantages is said to be that the coating process employed improves the uniformity of the thickness of the membrane which makes the time of release more precisely determinable and further narrowing the time period required for complete release over a given batch.

Walles et al do not disclose or suggest the nature of the release mechanism if the particles incorporated in the membrane are larger than submicron.

The teaching, inferences, disclosure and claims of Walles et al are all **limited** to submicron size particles and agent release by rupture. The only connection between Walles et al and Vijayendran et al is found in the disclosure of this invention. It is well established that the disclosure of an invention cannot be used as a basis to reject the invention.

There is no disclosure and no suggestion in Walles et al to substitute the urethane/vinyl hybrid polymer of this invention for the styrene-butadiene rubber used by Walles et al. There is no disclosure and no suggestion in Vijayendran et al to substitute the urethane/vinyl hybrid polymer of this invention for the styrene-butadiene rubber used by Walles et al.

There is no disclosure and no suggestion that styrene-butadiene rubber and urethane/vinyl hybrid polymer are equivalents.

There is no disclosure and no suggestion in Walles et al or Vijayendran et al that the rate of diffusion of an aqueous solution through a membrane comprised of a urethane/vinyl hybrid polymer can be controlled to prevent rupture of the membrane. There is no disclosure and no suggestion in Walles et al or Vijayendran et al that an aqueous solution can in fact diffuse at all through a membrane comprised of a urethane/vinyl hybrid polymer. Finally, there is no disclosure and no suggestion in Walles et al or Vijayendran et al that urethane/vinyl hybrid polymer can in fact be used as an encapsulating material.

All of the essential inventive features alluded to above are found solely and only in the disclosure of this invention. The Examiner's resort to the skilled artisan does not cure the deficiencies of the art to suggest the invention claimed herein.

The Examiner asserted (at page 4, lines 3-6 of the Office Action) that Vijayendran suggested the substitution of "polyurethane-vinyl polymer" in the invention of Walles "because of the expectation of successfully producing controlled-release composition..." The Examiner failed to cite the location of the alleged suggestion and Applicants have failed to find it. However, inspection of Vijayendran clearly reveals (at column 2, lines 48-56 and column 6, lines 33-36) that the polyurethane-vinyl polymer is to be applied to protect substrates, such as glass, cloth, leather, paper, metal, plastic (such as polystrene), foam, and wood. Such uses suggest that the substrates are to be protected from water. The capsule membrane of this invention does not protect the encapsulated chemical from water. Vijayendran et al clearly teach away from the use of the material in a process which requires the diffusion of water through the material to contact the encapsulated material. Vijayendran is not relevant as a secondary reference and should be withdrawn.

The rejection of claims 19, 22, 30 and 31 under 35 USC 103(a) as being obvious over Walles et al (US 4756844) and Vijayendran et al in view of Garcia et al (US 6436540 B1) is traversed for the above reasons and the following additional reasons.

The disclosure of Garcia adds nothing to cure the deficiencies of Walles and Vijayendran as references against the claims of this invention. That Garcia may disclose a cross linking agent for the polymer of Vijayendran does not by that fact render Vijayendran relevant as a reference. Garcia should be withdrawn.

The rejection of claim 17 under 35 USC 103(a) as being obvious over Walles et al (US 4756844) and Vijayendran et al in view of Newlove et al (US 5948735) is traversed for the above reasons and the following additional reasons.

The disclosure of Newlove adds nothing to cure the deficiencies of Walles and Vijayendran as references against the claims of this invention. That Newlove may disclose a breaker employed in the claims of this invention does not by that fact render Walles or Vijayendran relevant as a references. Newlove should be withdrawn.

This application is in condition for allowance. Reconsideration and allowance is requested.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that the within and foregoing document, together with the attachments referred to therein, if any, is being deposited by the undersigned with the United States Postal Service as first class mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231 on the date written just below my signature.

Thomas R. Weaver
Registration No. 25,613

December 5, 2002
Date

Marked up version claim 26

26. (As Amended) The article of claim 19 wherein said first chemical composition has a particle size in the range of from about 10 to about 60 mesh US Sieve Series.

Clean version claim 26

26. (As Amended) The article of claim 19 wherein said first chemical composition has a particle size in the range of from about 10 to about 60 mesh US Sieve Series.

Marked up version claim 27

27. (As Amended) The article of claim 22 wherein said first chemical composition has a particle size in the range of from about 10 to about 60 mesh US Sieve Series.

Clean version claim 27

27. (As Amended) The article of claim 22 wherein said first chemical composition has a particle size in the range of from about 10 to about 60 mesh US Sieve Series.

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	) Atty. Dkt. No. 00.05.12.1
Steven B. Laramay and	) Art Unit: 1617
John H. Schneider	)
Serial No. 09/770,931	) Examiner: Gina C. Yu
Filing Date: January 26, 2001	)
Title:	) Duncan, Oklahoma 73534
HOLLOW CAPSULE HAVING A WALL	)
PERMEABLE TO WATER OR AN	)
AQUEOUS SOLUTION	) Date: December 4, 2002

CITATION OF PATENT

The Honorable Commissioner
of Patents and Trademarks
Washington, D.C. 20231

Sir:

Applicants bring to the attention of the Examiner US Patent 6,444,316 which issued September 3, 2002, on application serial number 565,092 filed May 5, 2000. The patentees are Reddy, Crook, Gray, Fitzgerald, Todd and Laramay. The patent is assigned on its face to Halliburton Energy Services, Inc. Inventor Laramay is an applicant herein.

Respectfully submitted,

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CERTIFICATE OF MAILING

I hereby certify that the within and foregoing document, together with the attachments referred to therein, if any, is being deposited by the undersigned with the United States Postal Service as first class mail in an envelope addressed to the Commissioner of Patents and Trademarks, Washington, D.C. 20231 on the date written just below my signature.

Thomas R. Weaver
Registration No. 25,613

December 5, 2002
Date